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Decision-Making Under Uncertainty

Conference on Real World Applications and Solutions to
Microbial Risk Assessment

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EPA Is a Risk-Based Agency

- Agency manages risk to human health and the environment – complex decisions require sound information
- Risk assessment plays a key role in identifying important hazards and in developing management strategies
- Risk is considered a function of exposure and hazard (or toxicity), both of which have inherent uncertainties

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Supporting Agency Decisions


- EPA recognizes many new risk situations where characterizing uncertainty important for good decisions
 - Priority setting
 - Sustainability
 - Regulatory options
 - Homeland security
- Additional utility for VOI and research planning
- Will help Agency meet its transparency goals

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Microbial Risk Assessment in EPA

- Multiple programs and media
 - Pesticides
 - Water
 - Solid Waste
- Decision makers are confronted with
 - Complex problems
 - Complex assessments
 - Limited data
 - Short timelines



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Chemical vs. Microbial Uncertainties

- Hazard Identification
 - Methodology
- Dose-response relationships
 - Reconstructing exposure from epidemiological data
- Species extrapolation
 - Microbial specificity
- Environmental persistence
 - Decay kinetics
- Sensitive groups or populations
 - Modes of action

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Increasing Analysis of Uncertainty and Variability: Exposure

- Almost 10 years of experience in quantitatively analyzing uncertainty and variability in exposure
- Some challenges remain:
 - Data choices
 - Model uncertainty
 - Propagating uncertainty

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Increasing Analysis of Uncertainty and Variability: Toxicity

- New emphasis on uncertainty and variability in toxicity values
- Some resistance to quantifying uncertainty
- Recent scientific advice to the Agency
 - SAB (Ethylene Oxide)
 - NAS (Dioxin, TCE)

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General Advice From Scientific Community

- Increase quantitative characterization of uncertainty in dose-response assessments
- Consideration and use of multiple data sets and endpoints
- Explicit reporting of criteria for data selection
- Quantitative presentation of alternative low dose extrapolation models

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Supporting Enhanced Consideration of Uncertainty

- Efforts primarily focusing on chemical risk assessment
- Need to apply knowledge to microbial issues
- Some EPA product and activities
 - Risk Characterization Handbook
 - NAS/Institute of Medicine project
 - Probabilistic Risk Assessment workgroup

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Risk Characterization Handbook

- Principles of
 - Transparency
 - Clarity
 - Consistency
 - Reasonableness
- Risk Characterization helps decision makers
 - Achieve a better-informed decision
 - Understand the science
 - Build trust and credibility with staff, public and stakeholders



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NAS/IOM Panel

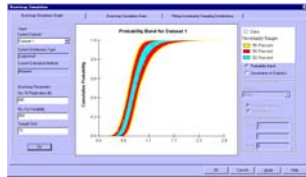
- Panel provides independent advice
- Tasked with providing advice on how to improve decision-making under uncertainty
 - Benefits
 - Tools
 - Communication
 - Implementation
- Panel has sought advice from
 - Agencies
 - Industry
 - Academia
 - Environmental groups
- Report expected in fall 2008

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Advancing Probabilistic Assessment at EPA

Office of Science Advisor Activity:

- White Paper on PRA Utility
- Case Studies
- Compiling tools, methods, best practices
- Expanded training



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Looking to the Future

- Approaches to public health and environmental decision-making under uncertainty:
get beyond "we won't know how to use this information"
- Specific tools and methods for informing decisions with quantitative analysis reflecting uncertainty in risks of specific outcomes.
- Methods for communicating uncertainty in risk information to a range of interested parties including decision makers and citizens

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Thank You!

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